3. STAFF, ORGANIZATION, AND FACILITIES

Staff

As of this writing, the Laboratory staff consists of 87 civil servants. Of these, 74 are scientists, and 4 are engineers; 69 hold doctoral degrees. In addition, over the past year we hosted 78 visiting scientists (NRC, ESSIC, JCET, USRA, and GEST) and 221 non-civil-service specialists supporting the various projects and research programs throughout the Laboratory.

Laboratory Pictures

LABORATORY FOR ATMOSPHERES STAFF, CODE 910

DATA ASSIMILATION OFFICE (DAO), CODE 910.3

MESOSCALE ATMOSPHERIC PROCESSES BRANCH, CODE 912

CLIMATE AND RADIATION BRANCH, CODE 913

ATMOSPHERIC EXPERIMENT BRANCH, CODE 915

ATMOSPHERIC CHEMISTRY AND DYNAMICS BRANCH, CODE 916

Organization

Figure 1 shows the Laboratory organization.

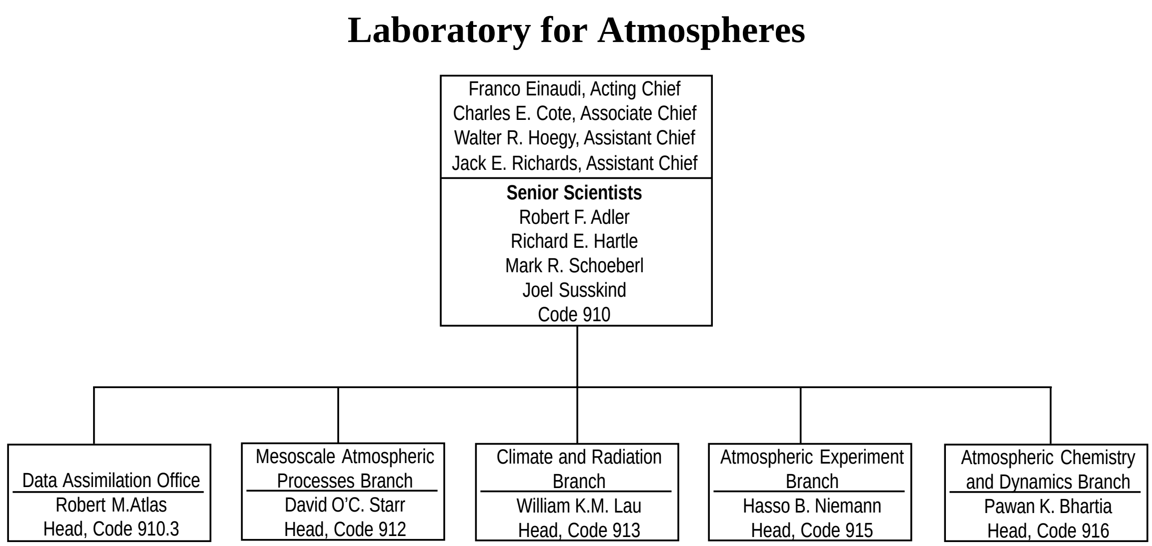

Figure 1. Laboratory for Atmospheres Organization Chart.

Data Assimilation Office (DAO), Code 910.3

The DAO combines all available meteorologically relevant observations with a prognostic model to produce accurate time series estimates of the complete global atmosphere. The DAO performs the following functions:

- Advancing the state of the art of data assimilation and the use of data in a wide variety of Earth-system problems
- Developing global data sets that are physically and dynamically consistent
- Providing operational support for NASA field missions and Space Shuttle science
- Providing model-assimilated data sets for the Earth Science Enterprise

For additional information on DAO activities, consult the World Wide Web (http://dao.gsfc.nasa.gov/)

Mesoscale Atmospheric Processes Branch, Code 912

The Mesoscale Atmospheric Processes Branch studies the physics and dynamics of atmospheric processes, using satellite, aircraft, and surface-based remote-sensing observations as well as computer-based simulations. This Branch develops advanced remote sensing instrumentation (with an emphasis on lidar) and techniques to measure meteorological conditions in the troposphere. Key areas of investigation are cloud and precipitation systems and their environments—from individual cloud systems, fronts, and cyclones, to regional and global climate. You can find out more about Branch activities on the World Wide Web (http://rsd.gsfc.nasa.gov/912/code912/).

Climate and Radiation Branch, Code 913

The Climate and Radiation Branch conducts basic and applied research with the goal of improving our understanding of regional and global climate. This group focuses on the radiative and dynamical processes that lead to the formation of clouds and precipitation and on the effects of these processes on the water and energy cycles of the Earth. Currently, the major research thrusts of the Branch are climate diagnostics, remote-sensing applications, hydrologic processes and radiation, aerosol/climate interactions, seasonal-to-interannual variability of climate, and biospheric processes related to the carbon cycle. You can learn more about Branch activities on the World Wide Web (http://climate.gsfc.nasa.gov/).

Atmospheric Experiment Branch, Code 915

The Atmospheric Experiment Branch carries out experimental investigations to further our understanding of the formation and evolution of various solar system objects such as planets, their satellites, and comets. Investigations address the composition and structure of planetary atmospheres, and the physical phenomena occurring in the Earth's upper atmosphere. We have developed and are constantly refining neutral gas, ion, and gas chromatograph mass spectrometers to measure atmospheric gas composition using entry probes and orbiting satellites. You can find further information on Branch activities on the World Wide Web (http://webserver.gsfc.nasa.gov/).

Atmospheric Chemistry and Dynamics Branch, Code 916

The Atmospheric Chemistry and Dynamics Branch engages in four major activities. The Branch performs the following functions:

- Developing remote sensing techniques to measure ozone and other atmospheric trace constituents important for atmospheric chemistry, climate studies, and air quality
- Developing models for use in the analysis of observations
- Incorporating results of analysis to improve the predictive capabilities of models
- Providing predictions of the impact of trace gas emissions on our planet's ozone layer

For further information on Branch activities, consult the World Wide Web (http://hyperion.gsfc.nasa.gov/).

Facilities

Computing Capabilities

Computing capabilities used by the Laboratory range from high-performance supercomputers to scientific workstations to desktop personal computers.

The supercomputers are operated for general use by the NASA Center for Computational Sciences (NCCS). Their flagship machine is a Cray T3E, with 512 DEC 21064 Alpha microprocessor processing elements, each with 64 Gbytes (Gb) of random access memory. Supercomputer resources are also available through special arrangement from NASA's Ames Research Center's Numerical Aerospace Simulation (NAS) facility.

Each Branch maintains a distributed system of workstations and desktop personal computers. The workstations are typically arranged in large clusters involving 30 or more machines. These clustered systems provide enormous computing and data storage capability, economical to maintain and easy to use. These machine clusters have been acquired to support specific programs, but may be made available for other research on a limited basis.

The Laboratory operates an autonomous ground station for continuously receiving, processing, and serving the Imager and Sounder radiometric data from the GOES satellites. The site also offers recent international geosynchronous satellite data from Japan (GMS-5), China (FY-2), and Europe (METEOSAT-5 and -7). In addition, we are developing a database of full-resolution radiances from India's geosynchronous satellite (INSAT) for the next few years.

Mass Spectrometry

The Laboratory for Atmospheres' Mass Spectrometry Laboratory is equipped with unique facilities for designing, fabricating, assembling, calibrating, and testing flight-qualified mass spectrometers used for atmospheric sampling.

The equipment includes precision tools and machining, material processing equipment, and calibration systems capable of simulating planetary atmospheres. The facility has been used to develop instruments for exploring the atmospheres of Venus, Saturn, and Mars (on orbiting spacecraft), and of Jupiter and Titan (on probes). The Mass Spectrometry Laboratory will also be used in support of comet missions. In addition, the Laboratory has clean rooms for flight instrument assembly and equipment for handling poisonous and explosive gases.

Lidar

The Laboratory has well-equipped facilities to develop lidar systems for airborne and ground-based measurements of aerosols, methane, ozone, water vapor, pressure, temperature, and winds.

Lasers capable of generating radiation from 266 nanometer (nm) to beyond 1,000 nm are available, as is a range of sensitive photon detectors for use throughout this wavelength region. The lidar systems employ telescopes with primaries up to 30 inches in diameter and high-speed counting systems for obtaining high vertical resolution. The Cloud, Aerosol, Lidar, Radiometer Laboratory has specialized facilities for optical instrument development including, optical tables, large auto-collimator, air handlers, and flow bench.

Lidars developed in the Laboratory include the Airborne Raman Ozone, Temperature, and Aerosol Lidar (AROTEL) to measure ozone, temperature and aerosols, the Stratosphere Ozone Lidar Trailer Experiment (STROZ LITE), to measure atmospheric ozone, temperature, and aerosols; the Large Aperture Scanning Airborne Lidar (LASAL), to measure clouds and aerosols; the Cloud Physics Lidar (CPL), to measure clouds and aerosols; the Scanning Raman Lidar, to measure water vapor, aerosols, and cloud water; and the Edge Technique Wind Lidar System, to measure winds.

Radiometric Calibration and Development Facility

The Radiometric Calibration and Development Facility (RCDF) supports the calibration and development of instruments for space-based measurements, for space shuttle demonstration flights, and for new ozone-measurement techniques.

As part of the Earth Observing System (EOS) calibration program, the RCDF will provide calibrations for future Solar Backscatter Ultraviolet/version 2 (SBUV/2) and Total Ozone Mapping Spectrometer (TOMS) instruments. Calibrations were conducted on the Scanning Imaging Absorption Spectrometer for Atmospheric Cartography (SCIAMACHY), flying on European Space Agency's (ESA) Environmental Satellite (ENVISAT) mission (2001); ODIN Spectrometer and IR Imager System (OSIRIS), on the Canada/Sweden ODIN mission (2001); and the Israeli Mediterranean Israeli Dust Experiment (MEIDEX) shuttle instrument (2001). The facility also is the home of Compact

Hyperspectral Mapper for Environmental Remote Sensing Applications (CHyMERA) (IIP) and Shuttle Ozone Limb Sounding Experiment/Limb Ozone Retrieval Experiment (SOLSE/LORE).

The RCDF contains state-of-the-art calibration equipment and standards traceable to the National Institutes of Standards and Technology (NIST). Calibration capabilities include wavelength, linearity, signal to noise (s/n), instantaneous field of view (IFOV), field of regard (FOR), and goniometry. The facility is also capable of characterizing such instrument subsystems as spectral dispersers and detectors.

The Facility includes a class 10,000 clean room with a continuous source of N_2 for added contamination control.